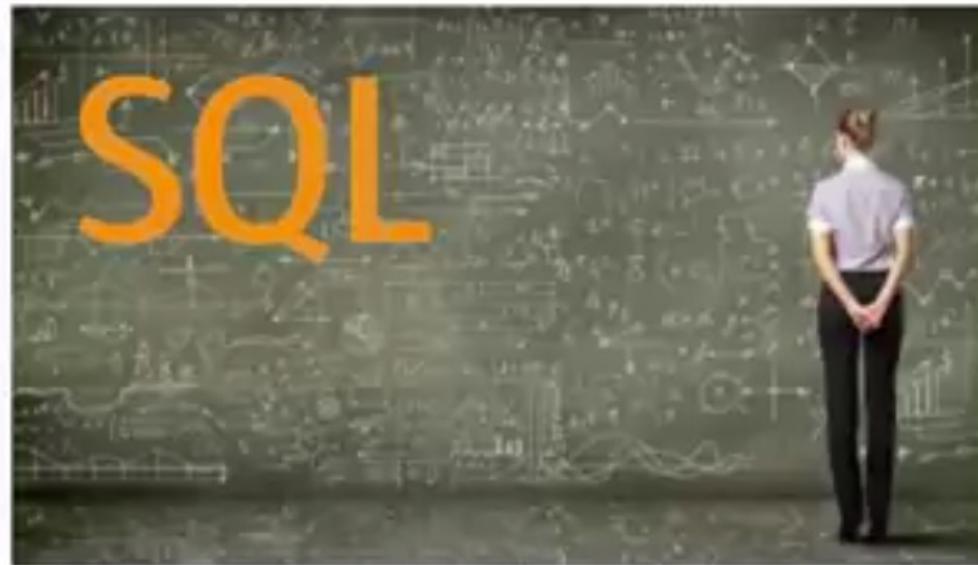


WEEK 1

Why SQL for Data Science

- Median based salary: \$110,000
- Job satisfaction score: 4.4/5
- Top spot on Glassoors best jobs in America
- Top three skills for a Data Scientist

Why SQL for Data Science



Why SQL for Data Science

- Big data
- Table with a few rows
- Small start up
- Big Database
- Mobile phone

Why SQL for Data Science

Advantages:

- Boost your professional profile
- Give you a good understanding of relational databases

Course details

- Basics for SQL and Relational Databases
- Working knowledge of SQL and Databases
- Connect to Database and run SQL queries
- Python and Jupyter Notebooks to Analyze Data
- Assignment to apply concepts with Real World Dataset

Introduction to Databases

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Course Overview

- Basics of SQL
- Relational Database Model
- At the end of this course, you will be able to discuss SQL basics and explain aspects of the relational database model
- At the end of this lesson, you will be able to:
 - Describe SQL, data, database, relational database
 - List five basic SQL commands

What is SQL?

- A language used for relational databases
- Query data



What is data?

- Facts (words, numbers)
- Pictures
- One of the most critical assets of any business
- Needs to be secure



What is a database?

- A repository of data
- Provides the functionality for adding, modifying and querying that data
- Different kinds of databases store data in different forms



Relational Database

- Data stored in tabular form - columns and rows
- Columns contain item properties e.g. Last Name, First Name, etc.
- Table is collection of related things e.g. Employees, Authors, etc.
- Relationships can exist between tables (hence: "relational")

Student ID	First Name	Last Name
34933	Victoria	Slater
93759	Justin	McNeil
20847	Jessica	Bennett
65947	Michelle	Dolin
24956	David	Price
65692	Franklin	Mullins
24271	Alissa	Lee

DBMS

- Database: repository of data
- DBMS: Database Management System - software to manage databases
- Database, Database Server, Database System, Data Server, DBMS - often used interchangeably



What is RDBMS?

- RDBMS = Relational database management system
- A set of software tools that controls the data
 - access, organization, and storage
- Examples are: MySQL, Oracle Database, IBM Db2, etc.



Basic SQL Commands

- Create a table
- Insert
- Select
- Update
- Delete

Summary

- You can now describe:
 - SQL
 - Data
 - Database
 - Relational Databases
 - RDBMS
 - 5 basic SQL commands:
 - Create, Insert, Select, Update, Delete

SELECT statement

Retrieving data from a table

SELECT Statement

At the end of this video, you will be able to:

- Retrieve data from a relational database table
- Define the use of a predicate
- Identify the syntax of the SELECT statement using the WHERE clause
- List the comparison operators supported by a RDBMS

Retrieving rows from a table

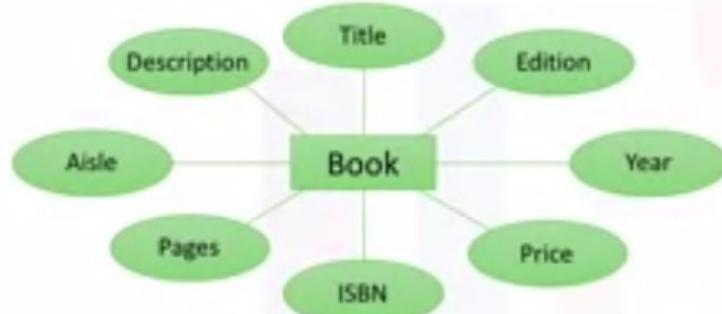
- After creating a table and inserting data into the table, we want to see the data
- SELECT statement
 - A Data Manipulation Language (DML) statement used to read and modify data

Select statement: **Query**

Result from the query: **Result set/table**

Select * from <tablename>

Using the SELECT Statement



Title	Edition	Year	Price	ISBN	Pages	Aisle	Description
Database Fundamentals	1	2010	24.99	978-0-98006283-1-1	300	DB-A02	Teaches you the fundamentals of databases
Getting started with DB2 Express-C	1	2010	24.99	978-0-98666283-5-1	280	DB-A01	Teaches you the essentials of DB2 using DB2 Express-C

Example: select * from Book

db2 => select * from Book

Book_ID	Title	Edition	Year	Price	ISBN	Pages	Aisle	Description
B1	Getting started with DB2 Express-C	1	2010	24.99	978-0-98666283-5-1	280	DB-A01	Teaches you the essentials of DB2 using DB2 Express-C
B2	Database Fundamentals	1	2010	24.99	978-0-98006283-1-1	300	DB-A02	Teaches you the fundamentals of databases
B3	Getting started with DB2 App Dev	1	2011	35.99	978-0-98086283-4-1	345	DB-A03	Teaches you the essentials of developing applications for DB2.
B4	Getting started with WAS CE	1	2010	49.99	978-0-98946283-3-1	458	DB-A04	Teaches you the essentials of WebSphere Application Server

4 record(s) selected.

Using the SELECT Statement



Title	Edition	Year	Price	ISBN	Pages	Aisle	Description
Database Fundamentals	1	2010	24.99	978-0-98006283-1-1	300	DB-A02	Teaches you the fundamentals of databases
Getting started with DB2 Express-C	1	2010	24.99	978-0-98666283-5-1	280	DB-A01	Teaches you the essentials of DB2 using DB2 Express-C

Example: select <column 1, column 2, ..., column n from Book

```
db2 => select book_id, title, edition, year, price, ISBN, pages, aisle, description from Book
```

Book_ID	Title	Edition	Year	Price	ISBN	Pages	Aisle	Description
B1	Getting started with DB2 Express-C	1	2010	24.99	978-0-98666283-5-1	280	DB-A01	Teaches you the essentials of DB2 using DB2 Express-C
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B4	Getting started with WAS CE	1	2010	49.99	978-0-98946283-3-1	458	DB-A04	Teaches you the essentials of WebSphere Application Server

4 record(s) selected.

Retrieving a subset of the columns

- You can retrieve just the columns you want
- The order of the columns displayed always matches the order in the SELECT statement
 - SELECT <column 1>, <column 2> from Book

```
db2 => select book_id, title from Book
Book_ID      Title
-----        -----
B1           Getting started with DB2 Express-C
B2           Database Fundamentals
B3           Getting started with DB2 App Dev
B4           Getting started with WAS CE
4 record(s) selected.
```

Restricting the Result Set: WHERE Clause

- Restricts the result set
- Always requires a Predicate:
 - Evaluates to:
True, False or Unknown
 - Used in the search condition
of the Where clause

```
select book_id, title from Book  
      WHERE predicate
```

```
db2 => select book_id, title from Book  
      WHERE book_id='B1'
```

Book_ID	Title
B1	Getting started with DB2 Express-C

1 record(s) selected

WHERE Clause Comparison Operators

```
select book_id, title from Book  
      WHERE book_id = 'B1'
```

Equal to	=
Greater than	>
Lesser than	<
Greater than or equal to	>=
Less than or equal to	<=
Not equal to	<>

Summary

Now you can:

- Retrieve data from a relational database table
- Define the use of a predicate
- Identify the syntax of the SELECT statement using the WHERE clause
- List the comparison operators supported by a RDBMS

COUNT, DISTINCT, LIMIT

Rav Ahuja



SKILLS NETWORK

IBM Developer

COUNT, DISTINCT, LIMIT

Rav Ahuja

COUNT

COUNT() - a built-in function that retrieves the number of rows matching the query criteria.

Number of rows in a table:

```
select COUNT(*) from tablename
```

COUNT

Rows in the MEDALS table where Country is Canada:

```
select COUNT(COUNTRY) from MEDALS  
      where COUNTRY='CANADA'
```

Result:

1

29

DISTINCT

DISTINCT is used to remove duplicate values from a result set.

Retrieve unique values in a column:

```
select DISTINCT columnname from tablename
```

DISTINCT

List of unique countries that received GOLD medals:

```
select DISTINCT COUNTRY from MEDALS  
      where MEDALTYPE = 'GOLD'
```

Result:

```
1
```

```
-----  
21
```

LIMIT

LIMIT is used for restricting the number of rows retrieved from the database.

Retrieve just the first 10 rows in a table:

```
select * from tablename LIMIT 10
```

LIMIT

Retrieve 5 rows in the MEDALS table for a particular year:

```
select * from MEDALS  
      where YEAR = 2018 LIMIT 5
```

Result:

COUNTRY	GOLD	SILVER	BRONZE	TOTAL	YEAR
Norway	14	14	11	39	2018
Germany	14	10	7	31	2018
Canada	11	8	10	29	2018
United States	9	8	6	23	2018
Netherlands	8	6	6	20	2018

INSERT Statement

INSERT Statement

At the end of this video, you will be able to:

- Identify the syntax of the INSERT statement
- Explain two methods to add rows to a table

Adding rows to a table

- Create the table (CREATE TABLE statement)
- Populate table with data:
 - INSERT statement
 - a Data Manipulation Language (DML) statement used to read and modify data



Author_ID	Lastname	Firstname	Email	City	Country
A1	Chong	Raul	rfc@ibm.com	Toronto	CA
A2	Ahuja	Rav	ra@ibm.com	Toronto	CA
A3	Hakes	Ian	ih@ibm.com	Toronto	CA
A4	Sharma	Neeraj	ns@ibm.com	Chennai	IN
A5	Perniu	Liviu	lp@ibm.com	Transylvania	RO

Using the INSERT Statement



Author_ID	Lastname	Firstname	Email	City	Country
A1	Chong	Raul	rfc@ibm.com	Toronto	CA
A2	Ahuja	Rav	ra@ibm.com	Toronto	CA
A3	Hakes	Ian	ih@ibm.com	Toronto	CA
A4	Sharma	Neeraj	ns@ibm.com	Chennai	IN
A5	Perniu	Liviu	lp@ibm.com	Transylvania	RO

```
INSERT INTO [TableName]
<([ColumnName],...)>
VALUES ([Value],...)
```

Using the INSERT Statement



Author_ID	Lastname	Firstname	Email	City	Country
A1	Chong	Raul	rfc@ibm.com	Toronto	CA
A2	Ahuja	Rav	ra@ibm.com	Toronto	CA
A3	Hakes	Ian	ih@ibm.com	Toronto	CA
A4	Sharma	Neeraj	ns@ibm.com	Chennai	IN
A5	Perniu	Liviu	lp@ibm.com	Transylvania	RO

```
INSERT INTO [TableName]
<([ColumnName],...)>
VALUES ([Value],...)
```

```
INSERT INTO AUTHOR
(AUTHOR_ID, LASTNAME, FIRSTNAME, EMAIL, CITY, COUNTRY)
VALUES ('A1', 'Chong', 'Raul', 'rfc@ibm.com', 'Toronto', 'CA')
```

Inserting multiple rows



Author_ID	Lastname	Fristname	Email	City	Country
A1	Chong	Raul	rfc@ibm.com	Toronto	CA
A2	Ahuja	Rav	ra@ibm.com	Toronto	CA
A3	Hakes	Ian	ih@ibm.com	Toronto	CA
A4	Sharma	Neeraj	ns@ibm.com	Chennai	IN
A5	Perniu	Liviu	lp@ibm.com	Transylvania	RO

INSERT INTO AUTHOR

(AUTHOR_ID, LASTNAME, FIRSTNAME, EMAIL, CITY, COUNTRY)

VALUES

('A1', 'Chong', 'Raul', 'rfc@ibm.com', 'Toronto', 'CA')

('A2', 'Ahuja', 'Rav', 'ra@ibm.com', 'Toronto', 'CA')

Question

A single INSERT statement can be used to insert ...

- only 1 row in a table
- at most 2 rows in a table
- one or multiple rows in a table
- only multiple rows in a table



Correct! You can insert 1 row, 2 rows, or more than two rows with a single INSERT statement.

[Skip](#)

[Continue](#)

Summary

Now you can:

- Identify the syntax of the INSERT statement
- Explain two methods to add rows to a table

Press **Esc** to exit full screen

UPDATE and DELETE Statements

UPDATE & DELETE Statements

At the end of this lesson, you will be able to:

- Identify the syntax of the UPDATE statement
- Identify the syntax of the DELETE statement
- Explain the importance of the WHERE clause in both the UPDATE and DELETE statements

Altering rows of a table – UPDATE statement

- After creating a table and inserting data into the table, we can alter the data
 - UPDATE statement: A Data Manipulation Language (DML) statement used to read and modify data

Author_Id	LastName	FirstName	Email	City	Country
A1	Chong	Raul	rfc@ibm.com	Toronto	CA
A2	Ahuja	Rav	ra@ibm.com	Toronto	CA
A3	Hakes	Ian	ih@ibm.com	Toronto	CA
A4	Sharma	Neeraj	ns@ibm.com	Chennai	IN
A5	Perniu	Liviu	lp@ibm.com	Transylvania	RO

Using the UPDATE Statement

Author_Id	LastName	FirstName	Email	City	Country
A1	Chong	Raul	rfc@ibm.com	Toronto	CA
A2	Ahuja	Rav	ra@ibm.com	Toronto	CA
A3	Hakes	Ian	ih@ibm.com	Toronto	CA
A4	Sharma	Neeraj	ns@ibm.com	Chennai	IN
A5	Perniu	Liviu	lp@ibm.com	Transylvania	RO

```
UPDATE [TableName]  
SET [[ColumnName]=[Value]]  
<WHERE [Condition]>
```

Using the UPDATE Statement

Author_Id	LastName	FirstName	Email	City	Country
A1	CHONG	RAUL	rfc@ibm.com	Toronto	CA
A2	AHUJA	RAV	ra@ibm.com	Toronto	CA
A3	HAKES	IAN	ih@ibm.com	Toronto	CA

```
UPDATE AUTHOR  
SET LASTNAME='KATTA'  
FIRSTNAME='LAKSHMI'  
WHERE AUTHOR_ID='A2'
```

Author_Id	LastName	FirstName	Email	City	Country
A1	CHONG	RAUL	rfc@ibm.com	Toronto	CA
A2	KATTA	LAKSHMI	ra@ibm.com	Toronto	CA
A3	HAKES	IAN	ih@ibm.com	Toronto	CA

Question

When using the UPDATE statement, if you do not specify the WHERE clause, all the rows in the table are updated.

- True
- False

✓ Correct

Skip

Continue

Deleting Rows from a table

- Remove 1 or more rows from the table:
 - DELETE statement
 - A DML statement used to read and modify data

```
DELETE FROM [TableName]  
<WHERE [Condition]>
```

Using the DELETE Statement

Author_Id	LastName	FirstName	Email	City	Country
A1	Chong	Raul	rfc@ibm.com	Toronto	CA
A2	Ahuja	Rav	ra@ibm.com	Toronto	CA
A3	Hakes	Ian	ih@ibm.com	Toronto	CA
A4	Sharma	Neeraj	ns@ibm.com	Chennai	IN
A5	Perniu	Liviu	lp@ibm.com	Transylvania	RO

DELETE FROM AUTHOR

WHERE AUTHOR_ID IN ('A2', 'A3')



Author_Id	LastName	FirstName	Email	City	Country
A1	Chong	Raul	rfc@ibm.com	Toronto	CA
A4	Sharma	Neeraj	ns@ibm.com	Chennai	IN
A5	Perniu	Liviu	lp@ibm.com	Transylvania	RO

Summary

Now you can:

- Identify the syntax of the UPDATE statement
- Identify the syntax of the DELETE statement
- Explain the importance of the WHERE clause in both the UPDATE and DELETE statements

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Databases and SQL for Data Sc... > Week 1 > Summary & Highlights < Previous Next >

Ungraded External Tool:
Hands-on Lab: COUNT, DISTINCT, LIMIT
35 min

Video: INSERT Statement
2 min

Video: UPDATE and DELETE Statements
3 min

Ungraded External Tool:
Hands-on Lab: INSERT, UPDATE, and DELETE
20 min

Reading: Summary & Highlights
5 min

SQL Cheat Sheet: Basics - SELECT, INSERT, UPDATE, DELETE, COUNT, DISTINCT, LIMIT
15 min

Summary & Highlights

Congratulations! You have completed this lesson. At this point in the course, you know:

- You can use Data Manipulation Language (DML) statements to read and modify data.
- The search condition of the WHERE clause uses a predicate to refine the search.
- COUNT, DISTINCT, and LIMIT are expressions that are used with SELECT statements.
- INSERT, UPDATE, and DELETE are DML statements for populating and changing tables.

Mark as completed

Like Dislike Report an issue

[Back](#) Practice Quiz

Practice Quiz • 15 min • 5 total points

1. Which of the following statements are correct about databases?

1 / 1 point

- A database is a repository of data
- There are different types of databases - Relational, Hierarchical, No SQL, etc.
- A database can be populated with data and be queried
- All of the above



Correct

Correct. All of the above statements are true.

2. True or False: A SELECT statement is used to retrieve data from a table.

1 / 1 point

[Back](#) Practice Quiz
Practice Quiz • 15 min • 5 total points

Correct

Correct. All of the above statements are true.

2. True or False: A SELECT statement is used to retrieve data from a table.

1 / 1 point

 True False

Correct

Correct. A SELECT statement is used to retrieve data from a table.

3. You are working on a Film database, with a FilmLocations table. You want to retrieve a list of films that were released in 2019. You run the following query but find that all the films in the FilmLocations table are listed.

1 / 1 point

[Back](#) Practice Quiz
Practice Quiz • 15 min • 5 total points

3. You are working on a Film database, with a FilmLocations table. You want to retrieve a list of films that were released in 2019. You run the following query but find that all the films in the FilmLocations table are listed.

1 / 1 point

```
SELECT Title, ReleaseYear, Locations FROM FilmLocations;
```

What is missing?

- A DISTINCT clause to specify a distinct year.
- Nothing, the query is correct.
- A LIMIT clause to limit the results to films released in 2019.
- A WHERE clause to limit the results to films released in 2019.

Correct

Correct. The query needs a WHERE clause like WHERE ReleaseYear=2019.

[Back](#) Practice Quiz

Practice Quiz • 15 min • 5 total points

4. Which of the following statements would you use to add a new instructor to the Instructor table.

1 / 1 point

UPDATE Instructor(ins_id, lastname, firstname, city, country)

WITH VALUES(4, 'Doe', 'John', 'Sydney', 'AU');

ADD INTO Instructor(ins_id, lastname, firstname, city, country)

VALUES(4, 'Doe', 'John', 'Sydney', 'AU');

SELECT Instructor(ins_id, lastname, firstname, city, country)

FROM VALUES(4, 'Doe', 'John', 'Sydney', 'AU');

INSERT INTO Instructor(ins_id, lastname, firstname, city, country)

VALUES(4, 'Doe', 'John', 'Sydney', 'AU');

Correct

Correct. The INSERT INTO statement is used to add rows to a table.

[Back](#) Practice Quiz

Practice Quiz • 15 min • 5 total points

5. What is the function of a WHERE clause in an UPDATE statement?

1 / 1 point

- A WHERE clause enables you to specify a new table to receive the updates.
- A WHERE clause enables you to specify which rows will be updated.
- A WHERE clause enables you to list the column and data to be updated.
- A WHERE clause is never used with an UPDATE statement.



Correct

Correct. A WHERE clause is used to restrict the rows in the result set. If you run a UPDATE statement without a WHERE clause, you will update all the rows in the table.

[Back](#)

Graded Quiz: Basic SQL

Graded Quiz • 9 min • 3 total points

Due Feb 5, 11:59 PM IST

1. True or False: The INSERT statement can be used to insert multiple rows in a single statement.

1 point

 True False

2. Assume there exists an INSTRUCTOR table with several columns including FIRSTNAME, LASTNAME, etc. Which of the following is the most likely result set for the following query:

1 point

```
SELECT DISTINCT(FIRSTNAME) FROM INSTRUCTOR
```

 LEON

LEON

PAUL

[Back](#)

Graded Quiz: Basic SQL

Graded Quiz • 9 min • 3 total points

Due Feb 5, 11:59 PM IST

2. Assume there exists an INSTRUCTOR table with several columns including FIRSTNAME, LASTNAME, etc. Which of the following is the most likely result set for the following query:

1 point

```
SELECT DISTINCT(FIRSTNAME) FROM INSTRUCTOR
```

 LEON

LEON

PAUL

PAUL

 LEON

PAUL

JOE

 LEON

PAUL

[Back](#)

Graded Quiz: Basic SQL

Graded Quiz • 9 min • 3 total points

Due Feb 5, 11:59 PM IST

 LEON KATSNELSON PAUL ZIKOPOLOUS JOE SANTARCANGELO

3. What does the following SQL statement do?

1 point

UPDATE INSTRUCTOR SET LASTNAME = 'Brewster' WHERE LASTNAME = 'Smith'

 Changes all rows for the instructor with a last name of Smith to have a last name of Brewster. Change the row for the instructor with a last name of Brewster to have a last name of Smith. Change all rows in the table to have a last name of Smith. Change all rows in the table to have a last name of Brewster.